The term white coat hypertension (WCH) was initially introduced in 1984 to describe patients who had hypertension in the office but were normotensive with ambulatory blood pressure monitoring (ABPM). At the time, WCH was simply a phenomenon with nothing known about its possible effect on the development of cardiovascular (CV) disease. Three decades later, it is apparent that hypertension in the office is a relatively poor predictor of CV risk in the individual, with ABPM now considered to be the best determinant of future CV events. Many patients diagnosed with WCH are not hypertensive on ABPM which leads one to ask: Why call a patient hypertensive when the final diagnosis will frequently be normal blood pressure (BP)?

White Coat Hypertension as a Risk Factor

Despite numerous clinical studies, there is still no consensus on whether WCH is a benign condition or a risk factor for the development of sustained hypertension and CV disease. WCH is generally diagnosed when a patient’s office BP is high and out-of-office (ABPM or home BP) is normal. A typical study examining WCH as a CV risk factor consists of a patient population classified at baseline into categories of normotension or white coat, masked and sustained hypertension on the basis of office and out-of-office BP, with follow-up of several years for the occurrence of CV events. Patients are sometimes subdivided into groups who at baseline are either untreated or on antihypertensive drug therapy. Treatment during follow-up has not been taken into account in most of the studies because of lack of data or difficulty of modeling survival analysis.

The results of individual studies on WCH and CV risk are somewhat inconsistent. In many instances, the investigators had difficulty matching a control (normotensive) group with the WCH patients for factors affecting future CV risk. The most easily recognized difference is the baseline ambulatory or home BP, which is usually lower in the normotensive group than in the WCH group. Epidemiological studies have shown an increase in CV risk starting at a systolic BP of 115 mmHg. For example, in a recent meta-analysis from the International Database on Home Blood Pressure in Relation to Cardiovascular Outcome (IDHOCO), which reported a higher CV risk for WCH in untreated patients, the normotensive group had a mean systolic home BP of 114.2 mmHg compared with 123.6 mmHg in the WCH group. This difference alone is sufficient to have been responsible for the statistically significant increase in CV events in the WCH group.

Even if one looks at the results of different meta-analyses, there is no consistent finding of an increased CV risk with WCH. The International Database on Ambulatory Blood Pressure in Relation to Cardiovascular Outcomes (IDACO) provides the best data on WCH and CV risk. IDACO used ABPM, and its population was community-based and not derived from samples from hypertension clinics. Also, an analysis from IDACO has been done in patients with systolic hypertension. Systolic BP is the best predictor of CV risk and increases more with the white coat response than does diastolic BP. In the IDACO analysis, there was no evidence of an increase in CV events with WCH, neither in untreated subjects nor in those treated for hypertension.

The IDHOCO investigators reported a significant increase in CV risk in untreated WCH subjects but not in treated ones. As previously mentioned, the mean systolic home BP in the untreated WCH subjects was higher by 9.4 mmHg than in the normotensive group. Another meta-analysis, which combined studies using ABPM and home BP, reported that WCH may be associated with a slightly higher CV risk. However, this analysis has limitations in methodology, such as including several meta-analyses as individual studies.

Recent studies may have raised new concerns about the clinical importance of WCH. In the Finn-Home study, progression to sustained hypertension during an 11-year follow-up was 3 times more likely in subjects with WCH compared with normotensive controls. Similarly, in the Dallas Heart study, Tientcheu et al reported an increase in CV events for 9.4 years in WCH versus normotensives. However, in these studies, the control normotensive and WCH groups were not well matched for baseline home BP, with the respective mean systolic BP values being 10.5 and 6 mmHg higher in the WCH groups. Because home BP is the better determinant of future CV risk, the presence of a higher baseline home BP, albeit in the normotensive range, could account for the observed increase in CV events in the WCH group.

Thus, the literature on WCH and CV risk may at times be inconsistent and somewhat confusing, increasing the likelihood that some physicians may focus on its possible long-term risks and still opt to treat WCH, despite out-of-office BP being normal and the lack of any demonstrated benefit of drug therapy on CV risk in WCH in clinical trials.
The Paradox of White Coat Hypertension

WCH is a paradox because its severity does not necessarily predict CV risk, which is determined by the level of the ambulatory or home BP and not by the difference between the BP inside versus outside of the office. For example, a group of patients with a mean office BP of 148/88 mm Hg and mean awake ambulatory BP of 133/83 mm Hg should have a higher CV risk than another group with a mean office BP of 148/88 mm Hg and awake ambulatory BP of 128/77 mm Hg. If a higher awake ambulatory BP is a stronger predictor of CV risk, which meta-analyses have consistently shown to be true. Under these circumstances, milder WCH can paradoxically carry a higher CV risk than more severe WCH.

The paradox of WCH is based on several fallacies. WCH is derived from the combination of 2 tests, office BP (screening test) and ABPM or home BP (diagnostic test). Possible hypertension is detected by the screening test, whereas the diagnostic test indicates that the BP is normal. A diagnosis of WCH hypertension is therefore inherently confusing. If the diagnostic test says that BP is normal, how can some type of hypertension be present?

Moreover, calculating WCH using 2 arbitrary cut points for continuous variables has the potential for producing a confusing and possibly misleading result. This is especially true when one variable (ABPM) is a much stronger determinant of CV risk than the other (office BP). Small increases in ambulatory BP can change both the diagnosis and the CV risk, whereas large increases in office BP may produce a much greater white coat effect without altering CV risk. Furthermore, the continuous association of out-of-office BP with CV risk is ignored.

The Clinical Implications of Diagnosing White Coat Hypertension

When individual studies and meta-analyses report an increase in CV events associated with WCH, both physicians and patients may get the impression that anxiety-induced BP increases in the office are harmful, which is not proven and certainly not true for all persons with WCH. A diagnosis of hypertension can have a negative impact on health status, as perceived by both the individual and others. Depending on their understanding of the scientific literature, physicians may be inclined to treat WCH regardless of ABPM or home BP, especially because the diagnosis contains the term hypertension. Patients who are self-educated about hypertension from the media and Internet may express concerns to their physicians about having an increased CV risk because of their WCH. Even if the doctor believes that WCH is not the same as sustained hypertension, he/she may feel obligated to prescribe medication to avoid a malpractice lawsuit if the untreated patient coincidentally happens to experience a CV event at a later date. Litigation for such a scenario is not uncommon in the United States.

Patients may also fixate on having a diagnosis of hypertension, which, in itself, has been shown to have important consequences. In one study in the pre-Internet age, patients who were given a diagnosis of hypertension experienced increased absenteeism from work compared with those not told about their condition. Today, with multiple sources of information on health-related topics available, a diagnosis of a type of hypertension such as WCH could likely be associated with common symptoms, such as headache, increased fatigue, and poor concentration.

A diagnosis of hypertension based on the office BP could have financial consequences. In the Ohasama study, the introduction of home BP in the diagnosis and management of hypertension was shown to substantially reduce medical costs. Life insurance premiums may also be increased if an individual is diagnosed with hypertension, even if it is WCH. Thus, a diagnosis of WCH may have unintended negative effects, without providing any additional benefit to the patient or physician.

Replacing White Coat Hypertension With White Coat Phenomenon

By now, it should be clear that the BP status of an individual should not be defined in terms of office BP, which is a relic of the past. Instead, office BP should be a screening test, which may lead to a diagnosis of hypertension or to a normal BP, pending further investigations with a diagnostic test such as ABPM or home BP. By definition, patients with WCH are normotensive on the basis of the best available techniques for defining hypertension, that is, ABPM and home BP. Depending on the absolute level of their out-of-office BP, they may or may not be at increased risk of experiencing a CV event. If so, why label all these patients as having a kind of hypertension? There are better terms that could be used to describe these patients, such as white coat phenomenon (WCP).

Using WCP to describe patients with a much higher office BP than out-of-office BP would also be better because it does not carry the stigma of hypertension. A diagnosis of WCP still identifies a patient as having an office-induced BP increase, which can then lead to a more careful follow-up of BP status to identify possible hypertension, without any suggestion of increased CV risk being present before a diagnosis is confirmed. It is clearly better to screen for hypertension without actually using the term hypertension until the diagnosis is confirmed with ambulatory or home BP. Guidelines for diagnosing hypertension follow this principle, so it would now seem appropriate to replace WCH with WCP.

In conclusion, patients with high office BP and normal out-of-office BP should be given a diagnosis of WCP instead of WCH. This approach avoids labeling patients with a misleading diagnosis of some kind of hypertension, while still identifying them as having a condition that merits further attention.

Disclosures

None.

References


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